



Expertise
and insight
for the future

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User support processes in a public organization

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Now that this time consuming but rewarding process is almost done, I would like to take a moment to see how I got here. Even though I had to change the subject and re-target the research multiple time during the process, it was always to make an actual impact to my team's work. We have had some challenges but this gave me a good reason to look into them in more detailed and systematic way.

I would like to thank everyone who participated directly and indirectly:

My thesis instructor and other teachers for a guidance and constructive feedback.

My colleagues for understanding my constant flow of questions and giving me feedback and ideas for improvements.

My wife for giving me time actually write this thesis.

Kari Sirviö

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<p>Objective of this study was to improve the User support processes in the public organization. It was done to improve the services and respond constantly increasing demand. ITIL and Lean were preselected as frameworks for the thesis, because both of them were already implemented and used as a background of the current services</p> <p>The research was started with the current state analysis, which was done with the interviews and the survey. The interviews were targeted to experts in the User support to find out weak segments of the process and survey was sent to all employees to find out the satisfaction level of the current services.</p> <p>The interviews revealed plenty of opportunities to improve but survey results did not give much of a new information, but the results will be used as a benchmark when the survey is done again. The survey is planned to re-done when all the improvements found in this thesis are implemented and new process has been stabilized.</p> <p>The outcome of the study is set of improvements in the current processes and new metrics to follow. The most important part of the proposal was a new allocation method for work items and SPC graphs to monitor variance in the process. This gave us tools to stabilize the service level and it helped distributing the know-how of certain support areas.</p> <p>Validation of the proposal was done with interviews and presentation of the findings. Proposal was mostly accepted but there were some minor adjustments done and concerns presented.</p>	
Keywords	

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1 Introduction

1.1 Overview

The purpose of this thesis is to evaluate service processes in User support. Evaluation is done using theoretical background from Lean and ITIL frameworks. ITIL is probably the most famous and widely known IT service framework and I will study how ITIL compliant Use support of the case company is and what should be done to improve processes. New version of ITIL v4 was published at the beginning of the year 2019 so I will compare our current processes against it and look also into Lean related literature. ITIL and Lean are pre-selected to be focused at because both are already used in the firm.

1.2 Case company description

The case company in this thesis is the Finnish Immigration Service (Migri). Migri is an authority responsible of immigration, citizenship, asylum and it maintains the refugee reception system in Finland. Immigration covers both, residence permits for immigrants from outside of EU and EU registrations for EU citizens. The citizenship unit is responsible for naturalization, and the asylum unit is investigating the grounds for asylum applications and refugees.

The department studied in this thesis is the IT department, and especially the User support section. My role in the organization is the head of User support section and we have 10 experts working in the User support. The IT department has three different sections: The development section is responsible of development of the case management system (UMA), which is used to process all the cases and applications received in Migri. The ICT office provides architectural services and IT hardware support to the organization. The User support is helping case workers in their problems using IT systems; mainly the case management system called UMA.

UMA is a custom developed case management system and it is used within Migri, Police, Border guard, Embassies, Reception centers, employment offices, etc. UMA has around 5 000 users on daily basis, and it has 30 integrations to other authorities' IT systems.

The User support is using a ticketing system for work management and currently used ticketing system is called ServiceDesk Plus. ServiceDesk Plus is an ITIL compliant system and we have implemented some of the ITIL recommended features in it, based on the needs of the case company. The user support is receiving around 100 tickets per day and the work is distributed with ServiceDesk Plus to all experts. Distributing the work is done manually into several different work queues, where experts collect work items to work on.

1.3 Problem description

The service processes in the user support are not efficient enough. The number of employees in Migri has grown from 300 to 1000 within 4 years and the amount of work requests to support teams has increased as well and we have challenges to keep up the pace. When resolve times for tickets are increased, it means that core function of decision making is suffering as well.

1.4 Research objective

The research objective is to propose improvements for the service processes. Improvements are created based on the analysis of the current state and review of theoretical approach around the service management. There was interviews and a survey for Migri personnel regarding the service quality of the User support, and the survey results will be used as benchmark when changes have been implemented and the survey is done again.

1.5 Key terms

This chapter describes the key terms and acronyms used in this research

ITIL	Information technology infrastructure library
Lean	Leading philosophy concentrating of removing waste in production
Work item	Independent project item indicating the type of work in the ticketing tool
Incident	Incident description work item in the ticketing tool

Problem	Problem description work item in the ticketing tool
Change request	Work item describing a request for a change in ticketing tool
Bug	Work item describing a failure in programming in the software
UMA	Case management system used in Migri
SD+	Ticketing tool used in the User support
Migri	The Finnish immigration services
CSA	Current state analysis
WIP	Work in progress

1.6 Thesis outline

The study was started with the current state analysis and the survey regarding user satisfaction with the current services. It contains both, quantitative and qualitative aspects in it, as I conducted user interviews and collected numerical data from the survey.

Existing knowledge was mostly from ITIL v4 and Lean related literature. The user support is already committed to ITIL and the company is streamlining its processes with Lean, so that is why those two were pre-selected as core literature.

The thesis is organized as follows; first I will create a clear vision of current state with interviews and a survey. Second, I will investigate existing knowledge and best practices. Third, I will propose improvements. Forth, I will validate those improvements and finally create a plan to implement them.

2 Research plan

This section introduces research plan and methods. The research is executed with multi method model and can be considered as applied research project. First, research design is explained, and schedule created. Second, data collection methods are introduced, and data analysis performed. Then theoretical framework applied and proposal for improvements provided.

2.1 Research approach

This chapter describes the research approach and methods.

2.1.1 Research type

Basic research is for expanding the existing knowledge of fundamental theory. Typically, it is done in general level and not concentrate on specific problem or process. Applied research uses scientific methods to develop a solution to a specific problem. (Hedric et al., 1993, p 3) This research is applied research with the purpose of improving specific processes in the case company.

Quantitative research is based on measurement or other numerical facts. It can be used in phenomena that can be presented in terms of quantity. Qualitative research on the other hand is about quality of certain aspects. Qualitative research is typically used when researching e.g. human behaviour. (Kothari, 2004, p 3) This research will combine both, quantitative and qualitative, as I will include the user survey and personal interviews in it.

2.2 Research design

Research design is following:

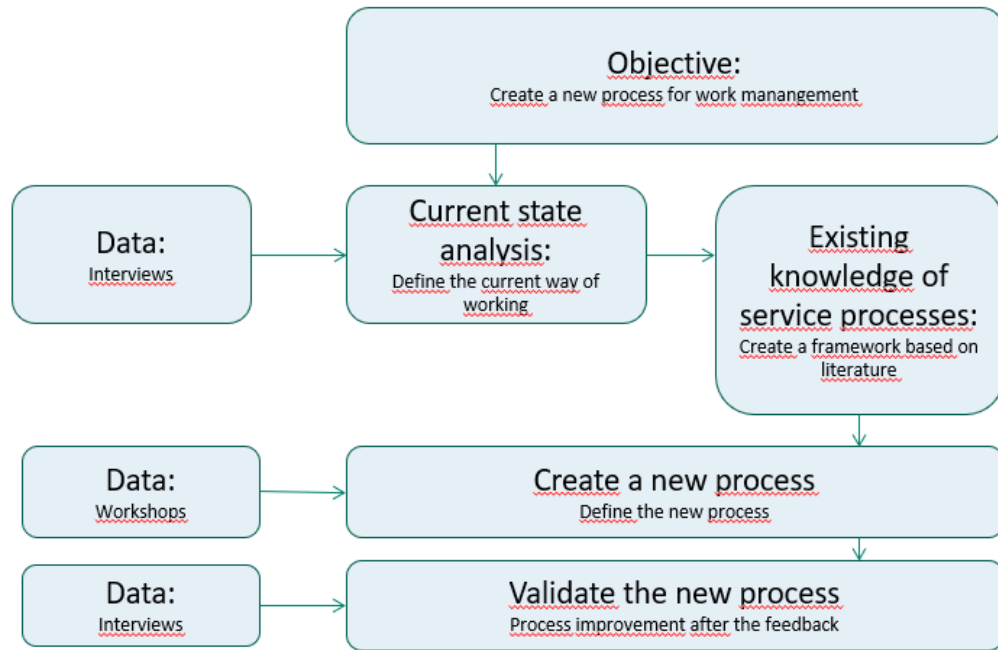


Figure 1. Research design

The research was started with clarifying the business challenge and objective of the study. When objective was clear, current state analysis was started by collecting data by interviewing people in the case company. The purpose of the interviews was to collect and understand better strengths and weaknesses of the current process and estimating the current compliance to the ITIL v4 framework.

After the current state analysis, I investigated the literature concentrating on ITIL v4 framework and Lean process management and set up workshops to plan an initial proposal. The initial proposal was created based on the findings from interviews, existing knowledge in the literature and process workshops. When the initial proposal was done, it was validated in interviews before implementing the changes in production.

2.3 Data collection and analysis

Data collection is done with interviews and surveys.

	Focus	Data type	Source	Outcome
Current state analysis	Description of the current process	Interviews Survey	Managers All personnel	<ul style="list-style-type: none"> • Current process • Strengths • Weaknesses
Building initial proposal	Applying theoretical framework	Workshops	Ground level workers	Initial proposal for a new process
Validation of final proposal	Validation of a new process	Interviews	Managers and ground level workers	Final proposal of the process

Table 1. Data collection plan

Interviews at the first phase were conducted in face-to-face with informal structure. I went through experts in the user support and asked questions regarding current process in general level and made notes of the conversations. Purpose of the interviews was to find out what is good in the current process and what is not working.

Survey was a questionnaire to all personnel, and it was sent out via email. Survey questions are explained in chapter 3.3.2.

I analysed the data in two parts. First part was to analyse the quantitative part from the survey. I created charts to visualize the results and investigated each answer to find out weak parts to improve. Second part was to analyse qualitative data from the interviews. This was done to collect challenging part of the processes systematically and create improvements in each part based on the literature or discussion in the workshops.

I arranged workshops to build the initial proposal, presented findings in the CSA and to find out improvable parts in the current process.

2.4 Research schedule

Research schedule is following

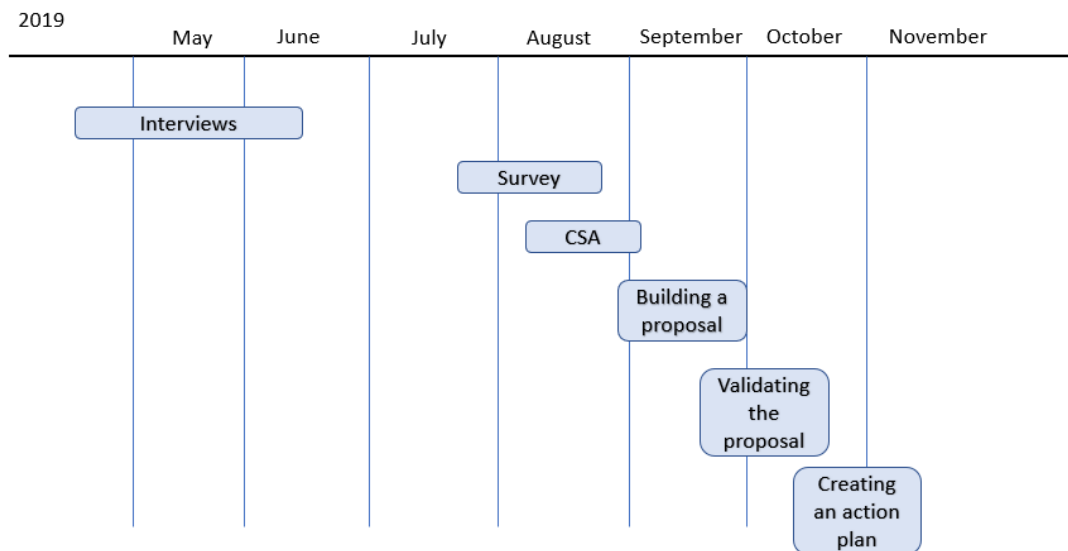


Figure 2. Research schedule

2.5 Validity and reliability

Validity of the research can be divided into four different parts:

- 1) Construct validity: Validating the constructs in the conceptual frameworks of the study.
- 2) Statistical validity: Validating the statistical methods in the study.
- 3) Internal validity: To make sure questions in the study are answered and which causal conclusions can be drawn.
- 4) External validity: Validating what is possible to generalize from the data of study.

(Hedrick et al, 1993, p 39 - 40)

3 Current state analysis

3.1 ITIL in case company

Migri has somewhat ITIL compliant processes implemented. It was done within 3 years ago together with ServiceDesk Plus tool implementation. Back then the processes were changed from plain email-based work flow to a ticketing tool. Email-based process was very vulnerable; task distribution was very problematic as emails were left unanswered and got missing, which led that no one was able to confirm the responsibility of certain task. Also, statistics were difficult to handle purely based on sent and received emails.

3.1.1 Incident management

As ITIL suggests, Migri has incident management process implemented (ITIL Foundation ITIL v4 Edition, 2019, p 121). Currently identified problematic parts are related to differentiating incidents and service requests. Sometimes tasks are dealt as incidents even though they should be service requests and it makes statistics unreliable. According to interviews, problems are also mixed up with incidents and for technicians are having challenges to identify when there should be problem created instead of dealing with it as incident.

SLA for incidents is not set at all so it does not give any baseline for process time of an incident. There is no external pressure to solve an incident when there is no target resolve times. Some incidents are never resolved, and an expert said that it is unclear what to do with them. The User support does not have any automatic closing procedure for old incidents, and they might be left floating for ages. An expert stated in the interview that sometimes they are unable to get any answers from customer to resolve the incidents and these cases are difficult to close.

3.1.2 Problem management

As with the incident management, case company has implemented problem management process according to ITIL framework (ITIL Foundation ITIL v4 Edition, 2019, p 130).

Based on the data received from interviews, technicians are having challenges to decide what to do with the opened problems. A Technician stated in the interview that sometimes problems are left open and they do not know for sure when an item should be closed. In addition to being unsure when to close them, technicians are also opening them with different basis. Typically, incident is closed, and problem opened but some seem to think that both types of items can be left open for the same issue. There are several ways inside the team for handling the problems. Others are closing them right after a bug for development team is created and some seems to think that they can be closed only when the problem is resolved, and resolution delivered to production environment. This leads to a situation where there are large amount of problem items and it gets challenging to maintain them.

It was clear after interviews that the current problem management process is not optimal. The case company has a dedicated person responsible of maintaining the work items, but the challenge is related to the unclear process of how to use them. As an expert said in the interview, they are considered as database of current problems of production, and sometimes only as work items to work with while investigating an issue. This leads to an unreliable understanding of big picture of production problems.

3.1.3 Change management

User support in the case company is using change management process from ITIL framework (ITIL Foundation ITIL v4 Edition, 2019, p 118) to deal with small change requests coming from end users. When a user finds a feature in the system that could be better with different functionality, they will inform the user support about it. Specialists in the user support evaluate the request and create a change request item for it if it is considered valid request. Then all open change requests are estimated and prioritised with key users from all the substance units. Certain type of small items can be done within internal user support team but most of them require an allocated small development team from software vendor and they are picking up those work items based on priority they are set with.

According to the interviews, the process works for the items that can be done within the internal user support team, but for the items that requires external software vendor, change request items are considered a double booking since they are registered anyways to a tool development team is using. Problem seem to be related to different tools the user support is using compared to the development team and the ICT office. An

expert remarked that none of the other teams are using ServiceDesk+ but they are using Microsoft TFS and it requires data to be moved from one to another.

Based on the interviews, it looks like it would be beneficial to use standard template to report change requests. End users have several different ways to describe their need for change and understanding of it is challenging. Experts are having difficulties to understand the actual change in the system when users are explaining the problems, they experience the system.

3.1.4 Strengths and weaknesses

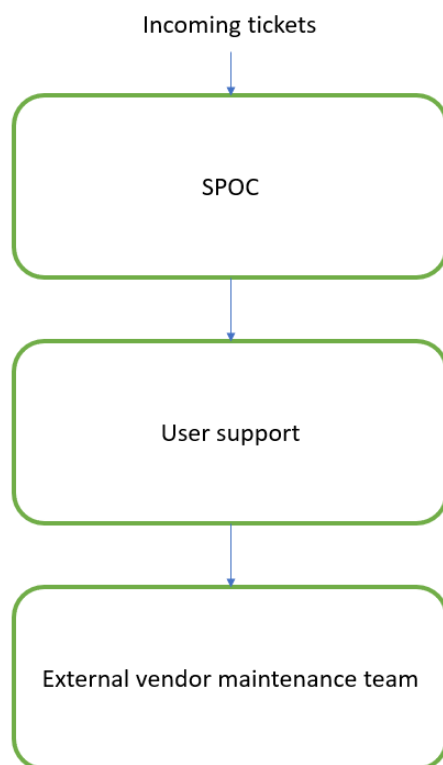
This chapter describes strengths and weaknesses of the processes found out in the interviews.

Strengths
Incident management, problem management and change management implemented
The ticketing tool is suitable for User support's needs
3-level support implemented and works well
Weaknesses
Unclear workflow for ticket processing
No SLA or any other metrics
Problem items are never closed
Double booking in change management process
Self-service portal not implemented in the ticketing tool

Table 2. Strength and weaknesses based on the interviews

3.2 3-level support

User support and application maintenance in the case company is divided into 3 level as following.



3.3 Current service level

This chapter describes the current service level based on the user satisfaction survey. Initial user satisfaction survey results will be used as a baseline for future surveys. There will be a new survey after proposed changes have been implemented; this will give us feedback of benefits of the changes.

3.3.1 User satisfaction survey

The survey was created to find out the current satisfaction level of case company's User support. Questions were designed in the way they would support finding the weak parts

of our current service and would help to improve the service. The survey was sent to all personnel via email and it was designed to be short enough to be answered within 5 minutes. The tool used in the survey was selected between Webropol and SurveyPal and first one was selected because case company will stop using latter at the end of this year and there would have been challenges saving and using survey results as a comparison in the future.

Principles for creating a good user satisfaction survey according to Customer Thermometer (<https://www.customerthermometer.com>) are

1. Define the purpose of the survey
 - Purpose is to find out current satisfaction level and creating a baseline for future surveys
2. Identify the target population
 - Our target population were people using services of the user support frequently
3. Use adequate sample size
 - All personnel were selected as recipients of the survey
4. Be brief
 - The number of questions were limited to 10 questions where 2 first were demographic questions
5. Considerately compose the survey
 - The questions were kept as simple as possible to avoid misunderstanding
6. Incentivize questions

- Incentivizing was not an option in this case but keeping the survey short got enough participants

7. Choose the right survey format

- Online form was the only option to get the results within 5 days and to reach all personnel

8. Test your survey

- The survey was tested by team members and some questions were re-phrased after feedback

9. Choose the right time

- The survey was scheduled not to overlap any other surveys to get as many participants as possible

10. Respond to respondents

- Respondents got a thank you letter, and results will be shared with all personnel

3.3.2 Survey questions

This chapter describes survey questions and reasons behind them. There were several surveys coming to the personnel and I wanted to keep the survey as short as possible, so the number of questions were limited to 10.

The survey started with 2 demographic questions; Unit and frequency of contact. I wanted to see if there are any different needs between the units. Frequency of contact was added to find out, how often our customers typically need help from the user support.

Demographic questions were followed by six claims with scales 'totally disagree', 'partially disagree', 'partially agree' and 'totally agree'. Claim were as follows:

Claim	Reason of the claim
It is easy to contact User support.	Currently main channel to contact the user support is to send email. I wanted to see if users are happy with that or do they want other ways as well.
Electronic form would be better to report problems.	We have been thinking about implementing an electronic form and I wanted to know what users think about it.
User support seems to understand your problem.	Sometimes we get feedback saying that the user support do not understand what they need, and I wanted to see how typical this is.
Additional questions User support ask are relevant to solve the problem.	Sometimes users have been complaining that they are asked unnecessary details.
Solutions User support provides are understandable.	I wanted to see how satisfied users are for the solutions the user support provides.
Improving instructions would decrease the need to contact the user support.	Improving instructions is always under discussion, because it takes time to create and maintain instructions and it is unclear if they would help users.

Table 3. Claims in user satisfaction survey

At the end two general questions regarding user support service were added: 'How satisfied are you for quickness in solutions User support provides' and 'How satisfied are you in general for services User support provides'. These were added to get the general satisfaction level for the services.

3.3.3 User satisfaction survey results

In this chapter describes the results and analysis of the survey results. We got 165 answers in total, which is a good amount, considering the survey was open only for 6 days. We had pressure to keep it short due to other surveys coming at the same time.

Answers by units

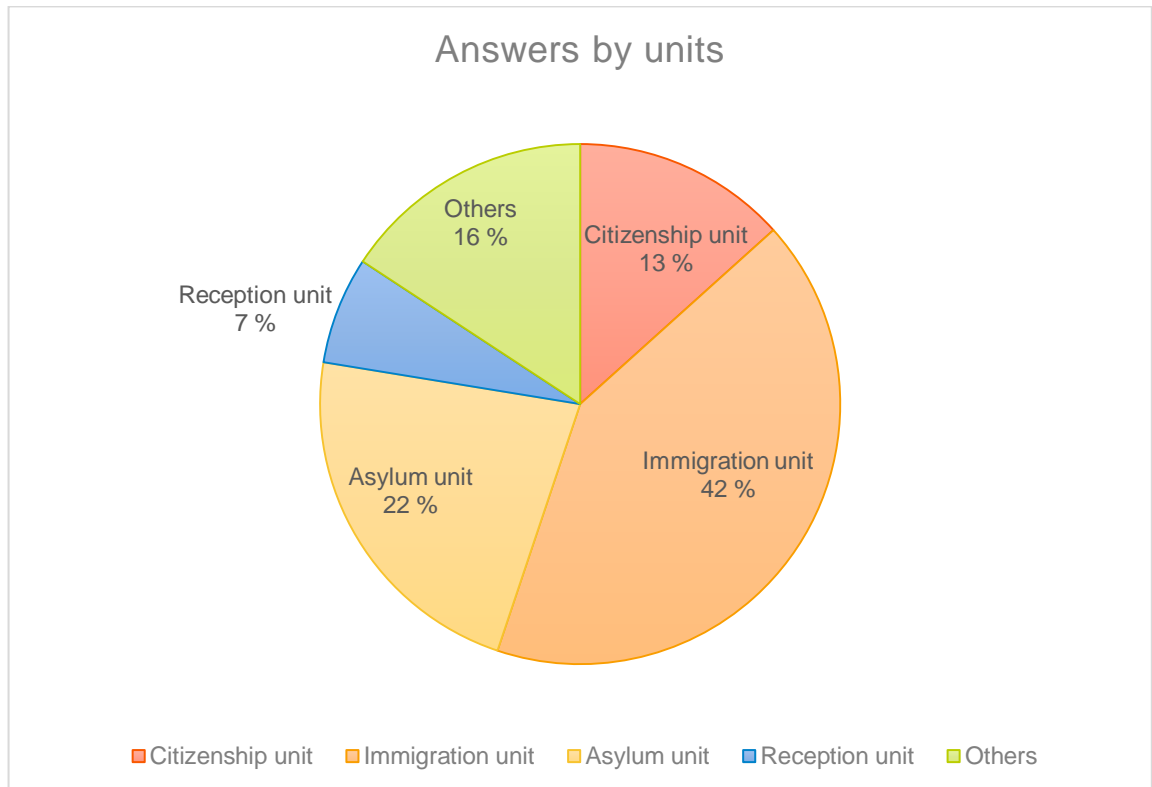


Figure 3. Answers by units

We got replies from all the units equally compared to size of the units.

How often do you contact the user support

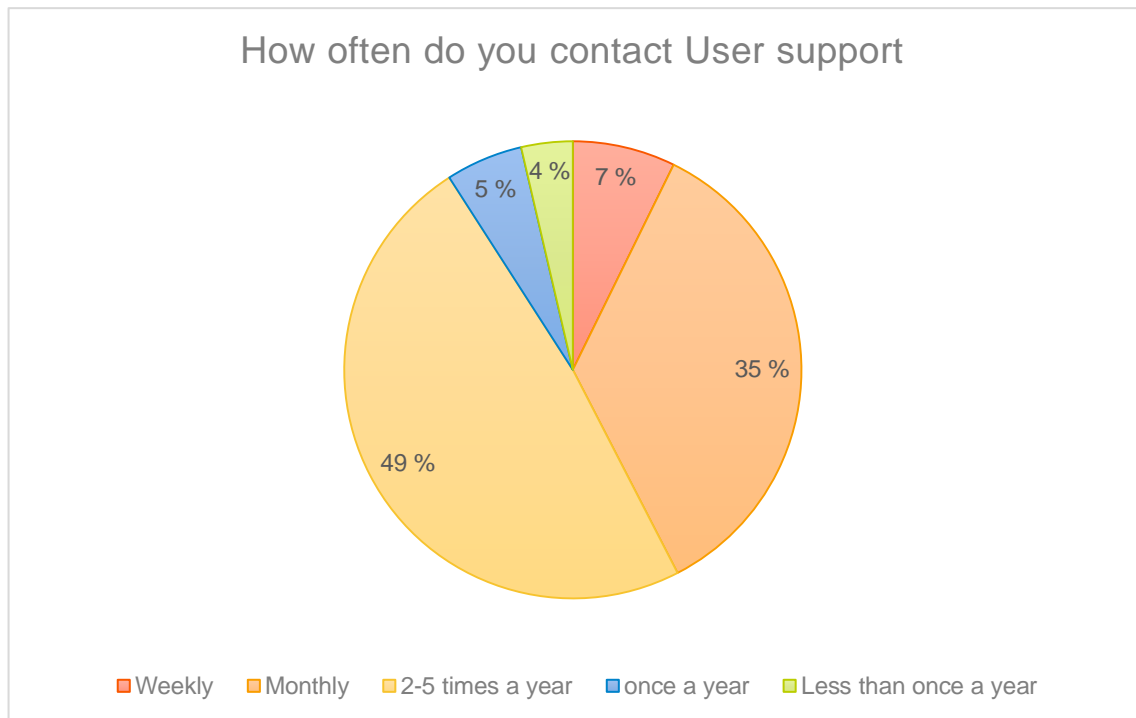


Figure 4. How often do you contact the user support?

Data shows that people need help from user support mostly 2 – 12 times per year. It was a bit of a surprise that there are 7 % of users that contact User support on weekly basis, but this might be due to bias that users who need more help are more willing to participate these sorts of surveys.

Claim 1: It is easy to contact the user support

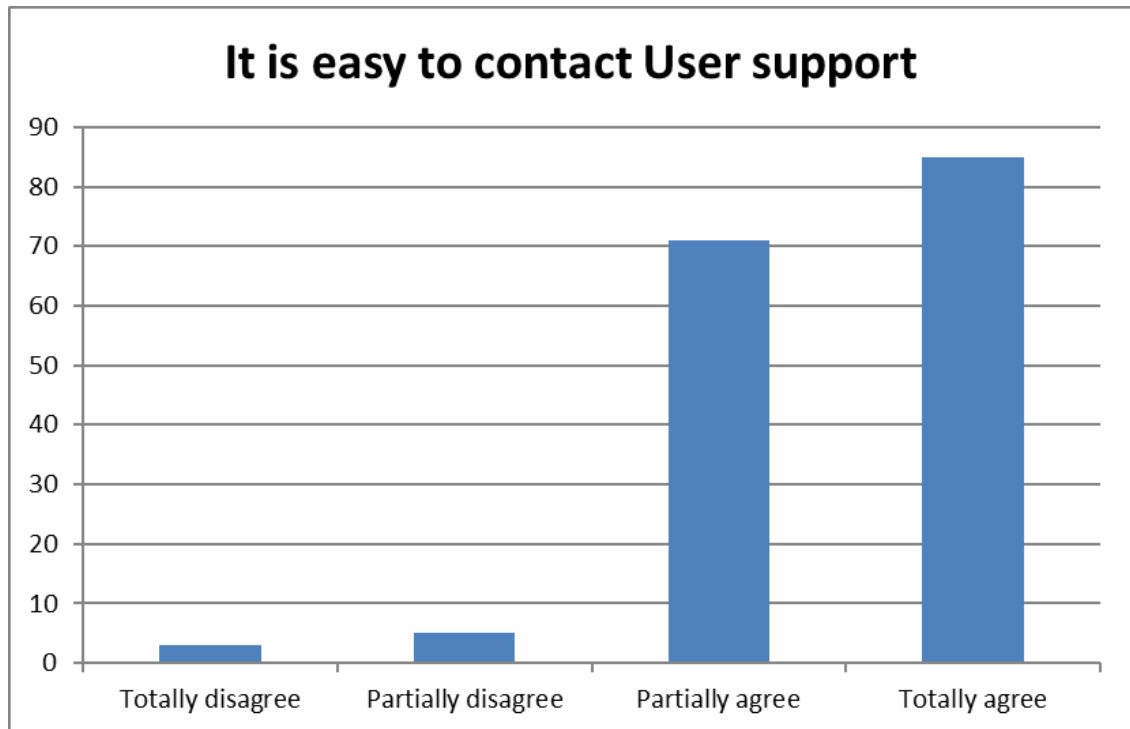


Figure 5. It is easy to contact the user support

As data shows, users are perfectly satisfied with the current way of contacting the user support via email.

Claim 2: Electronic form would be better to report problems to the user support

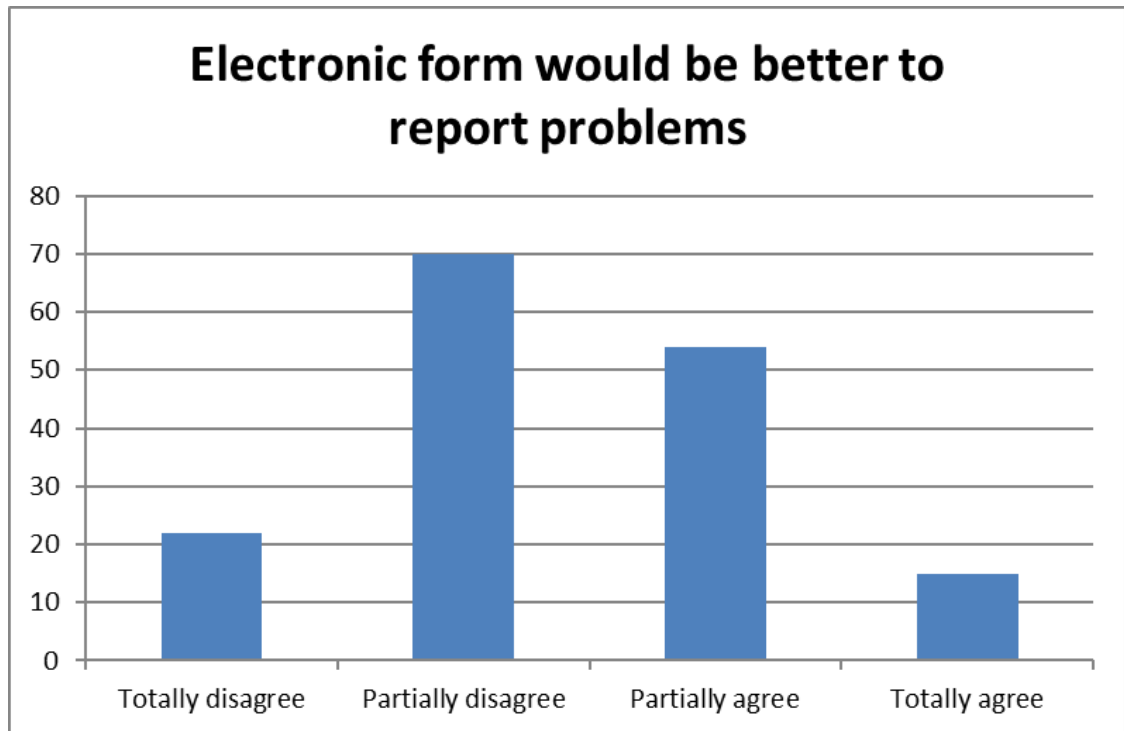


Figure 6. Electronic form would be better to report problems to the user support

This claim had wider spread in answers, but it slightly shows that users do not want structural forms to report problems. Forms could help users to report problems more systematically, but some might think it is unnecessary and would not benefit them.

Claim 3: Th user support seems to understand your problem

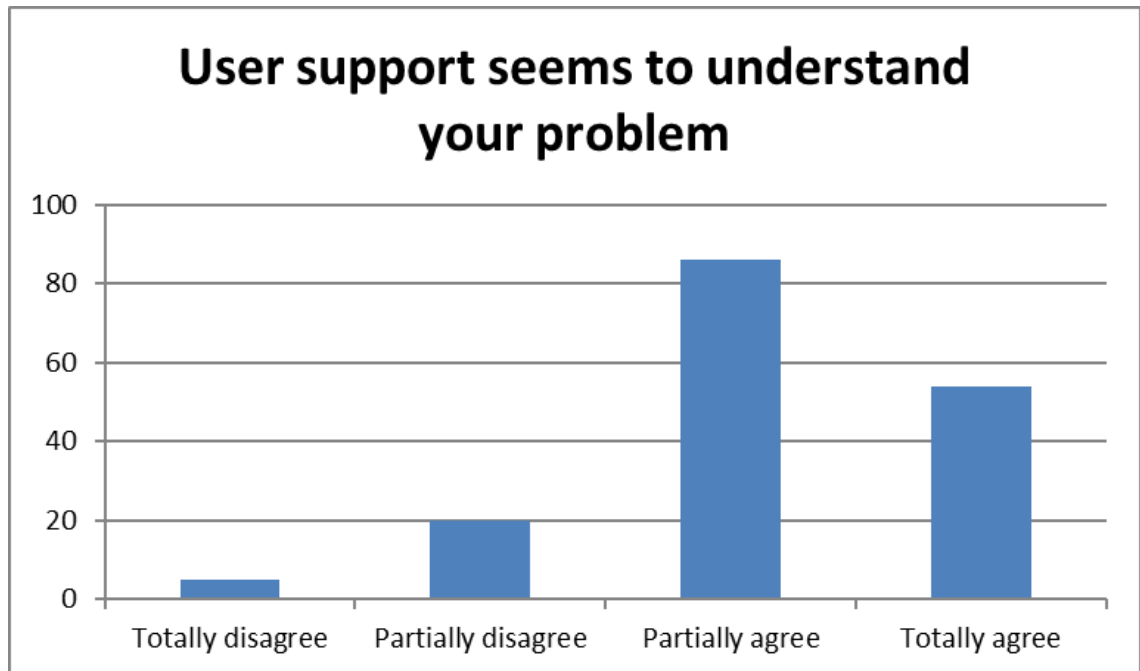


Figure 7. The user support seems to understand your problem

Data shows mostly positive answers to the question and does not give clear action point to improve ways of reporting problems. There are some answers in negative side and we have to think what could be done, but based on the result, there is no need to make major changes.

Claim 4: Additional questions the user support ask are relevant to solve the problem.

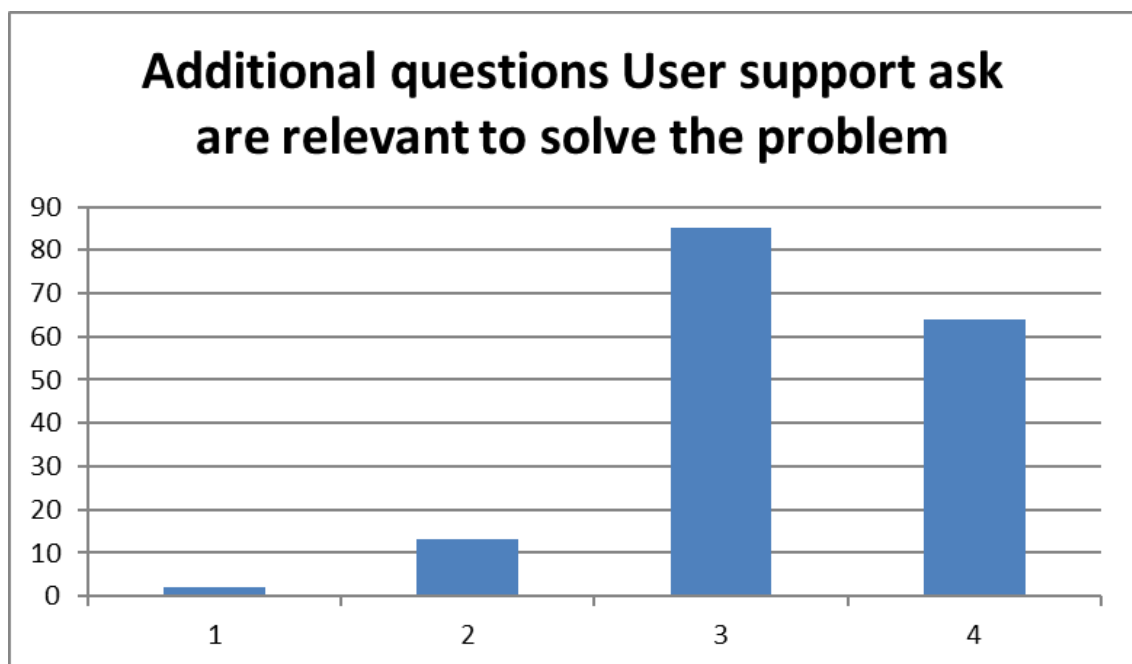


Figure 8. Additional questions the user support ask are relevant to solve the problem

According to data, users seems to think information the user support requests, is relevant and there is no indicator to create actions in this part.

Claim 5: Solutions the user support provides are understandable.

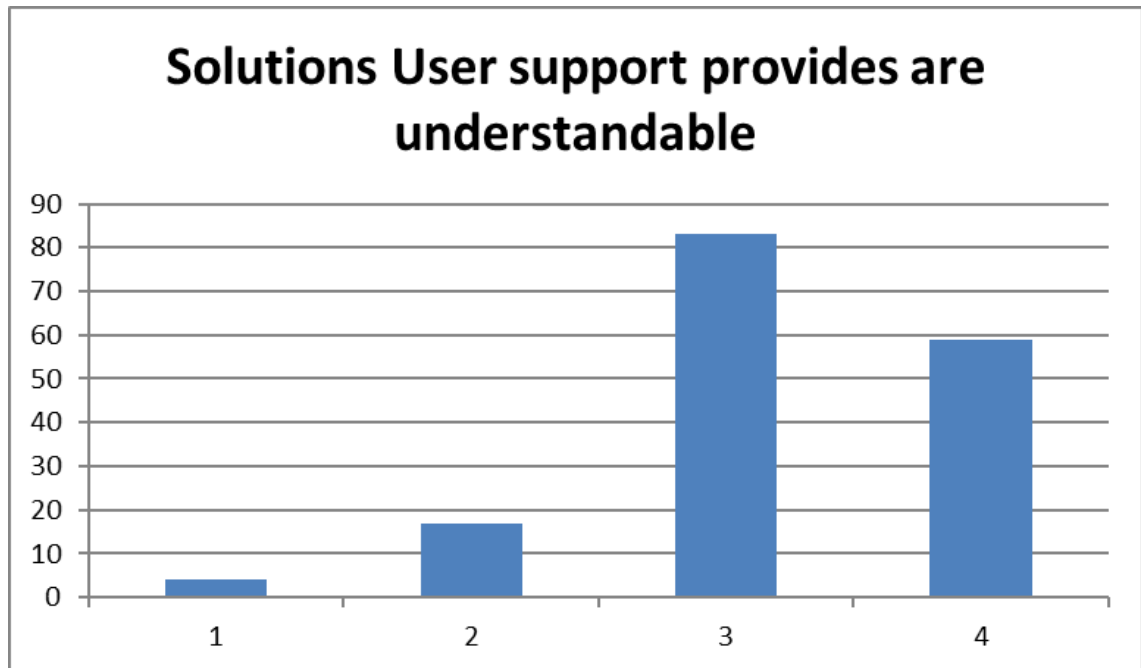


Figure 9. Solutions the user support provides are understandable

According to data, users are satisfied with solutions. General feedback we get, implies that this could have been a problematic area, is not supported with survey results.

Claim 6: Improving instructions would decrease the need to contact the user support.

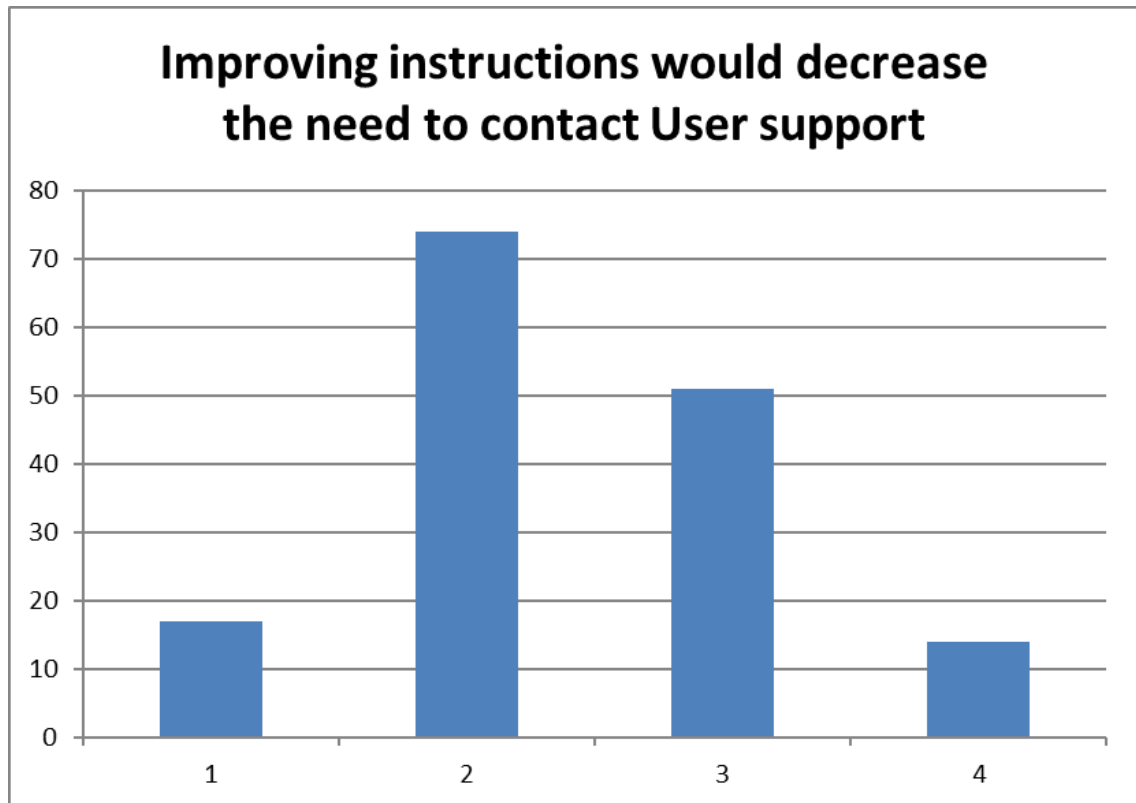


Figure 10. Improving instructions would decrease the need to contact the user support

Data is more spread on this question as well. Some users seem to think they would benefit from better instructions but most of them not. We do have an ongoing project for improving instructions, but its scope is not clear yet, and according to data, it's not clear how much we should put effort in it. Anyways we need to think of ways how to improve self-help with the problems and instructions are one part of it.

How satisfied are you for quickness in solutions User support provides?

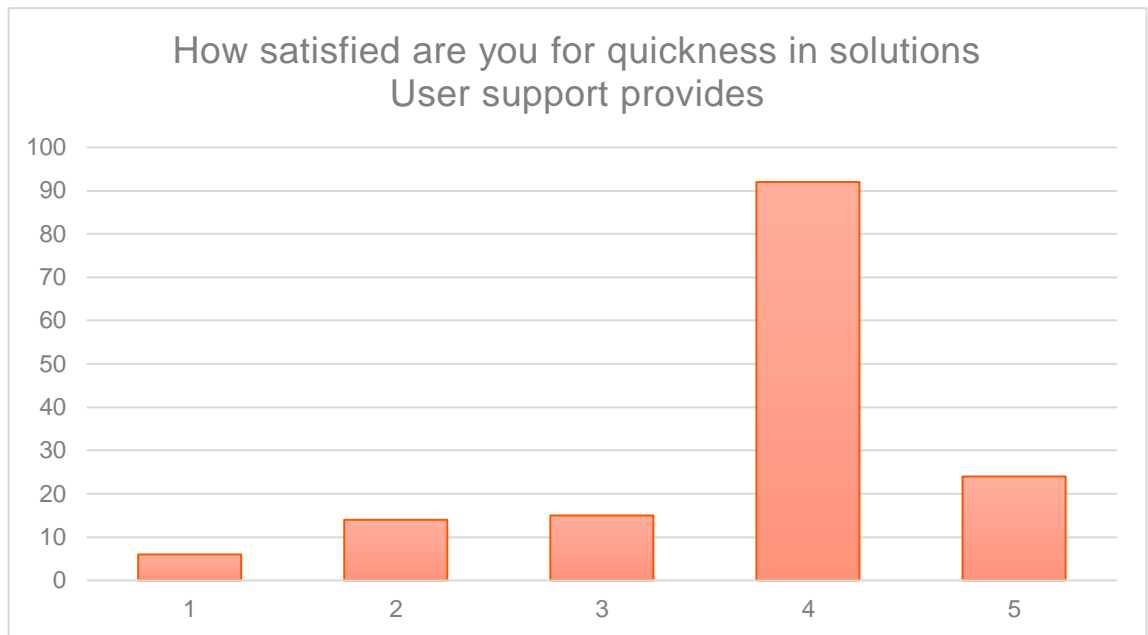


Figure 11. How satisfied are you for quickness in solutions the user support provides?

Considering all the answers, mean is 3.75, which is good in the situation where our answering times have been grown. Regardless, this is something we have to take actions and start monitoring the progress better.

How satisfied are you in general for services User support provides?

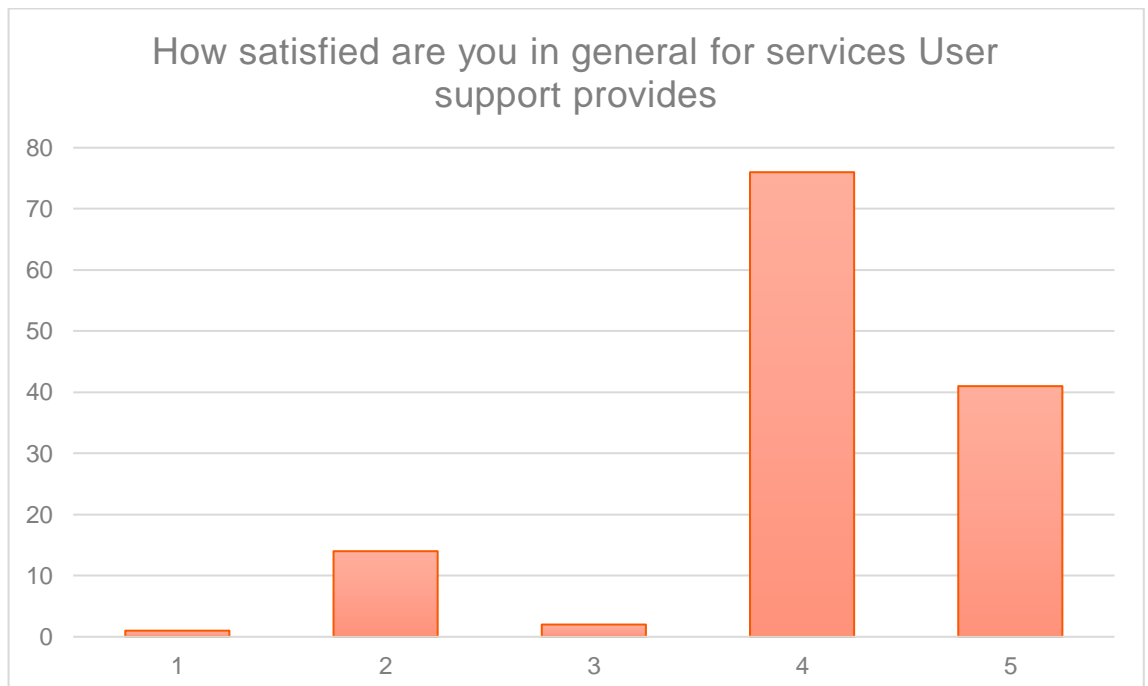


Figure 12. How satisfied are you in general for services the user support provides?

General satisfaction to the user support is also in good level. Mean in all answers were 4,06 and it will be challenging to improve it after the changes we will make.

3.3.4 Summary

This chapter describes the summary of the survey results. In total, 165 employees answered the survey and distribution between the units were expected. According to the results, people contact user support mostly 2 – 12 times per year.

Strengths and weaknesses based on the results:

Strengths
It is easy to contact the user support
The user support seems to understand the problem
Additional questions asked by the user support are relevant
Solutions provided are good
The user support is quick with the answers
People are quite satisfied with the user support service in general
Weaknesses
Instructions could be better
Some users would prefer electronic forms

Table 4. Strengths and weaknesses based on the result

In general, the survey results were good and did not reveal any clear point of improvements. The user support has been struggling with increasing response times, but it did not show in the results.

I made a strategic choice of leaving out a comment section in the survey and used only predefined answer options and this was a mistake. Some questions got very dispersed answers and it would have been good to get explanations behind the bad ratings. Even though average was fairly good in questions 'How satisfied are you for quickness..' and 'How satisfied are you general..', it would have been beneficial to get comments from those who rated 1 for those questions. Next time I will arrange this survey, I will add a comment field after every selection.

4 Theoretical framework

This section describes the theoretical frameworks used in this research. I will concentrate on ITIL and Lean, but there might be ideas and influences from other frameworks as well. ITIL was selected because we already had somewhat ITIL compliant processes and we got ITIL training arranged for the team. Lean, on the other hand, is used in the company and we have had a managerial pressure to streamline our processes based on Lean.

4.1 Introduction to ITIL V4

ITIL is probably the most famous IT service management framework in the world. It has been the most trained and popular certification program for over 30 years (ITIL Foundation, 2019, p2).

4.1.1 Service value system

ITIL foundation released new version of ITIL in 2019 and focuses on service value systems (SVS). ITIL SVS describes how the various activities and processes can work together and create value through IT services. It requires good integrations between processes and ITIL SVS will facilitate these integrations (ITIL Foundation, 2019 edition, p3).

The core components of the ITIL SVS are:

- The ITIL service value chain
- The ITIL Practices
- The ITIL guiding principles
- Governance
- Continual improvement

The ITIL SVS describes an operating model for services. Service value system can be described as follows:

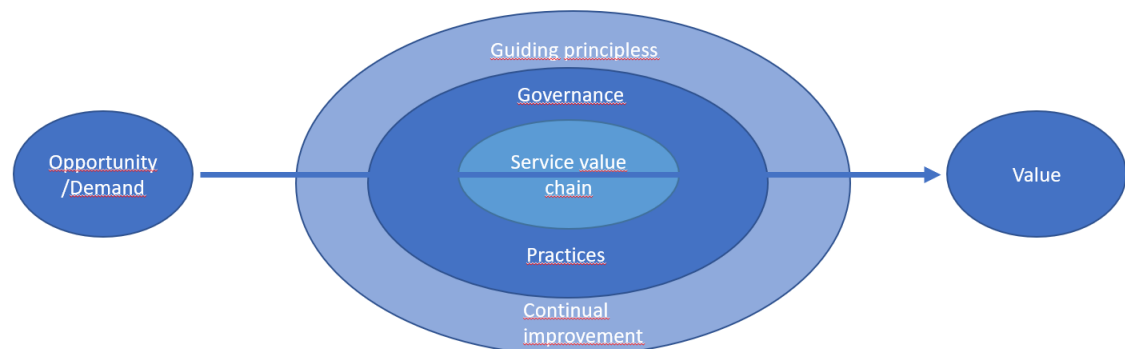


Figure 13.
ITIL Service value system (ITIL Foundation ITIL v4 Edition, 2019, p 3)

4.1.2 Four dimensions of service management

To reach the set goals in any environment, organizations should take into consideration all aspects of their behavior. To support this, ITIL has introduced holistic approach to service management and listed four dimensions that are critical to efficient value creation. These are:

- Organization and people
- Information and technology
- Partners and suppliers

- Value streams and processes

When planning changes to current services or designing completely new ones, all of the above dimensions should be taken into consideration.

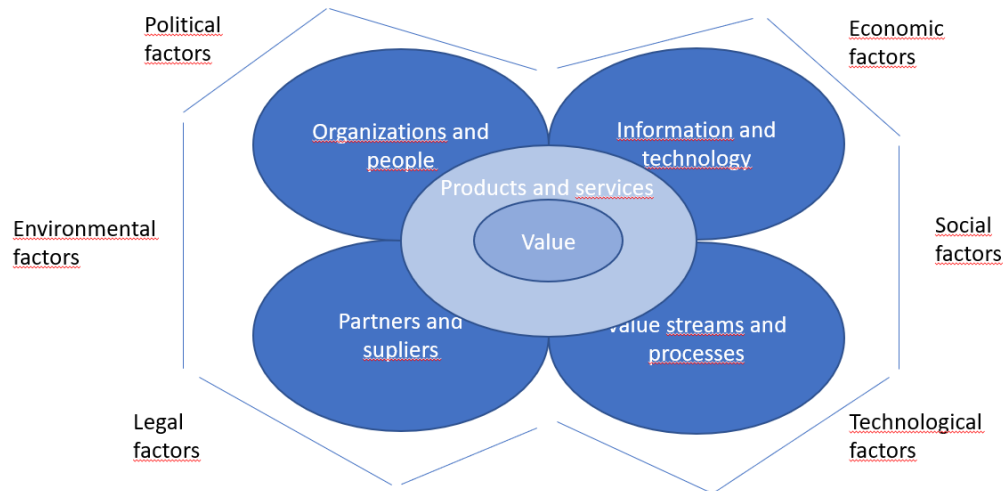


Figure 14. Four dimensions of service management (ITIL Foundation ITIL v4 Edition, 2019, p 25)

4.1.3 Service value chain

The core of the service value system is the service value chain. It defines the operational activities related to the creation and management of services.

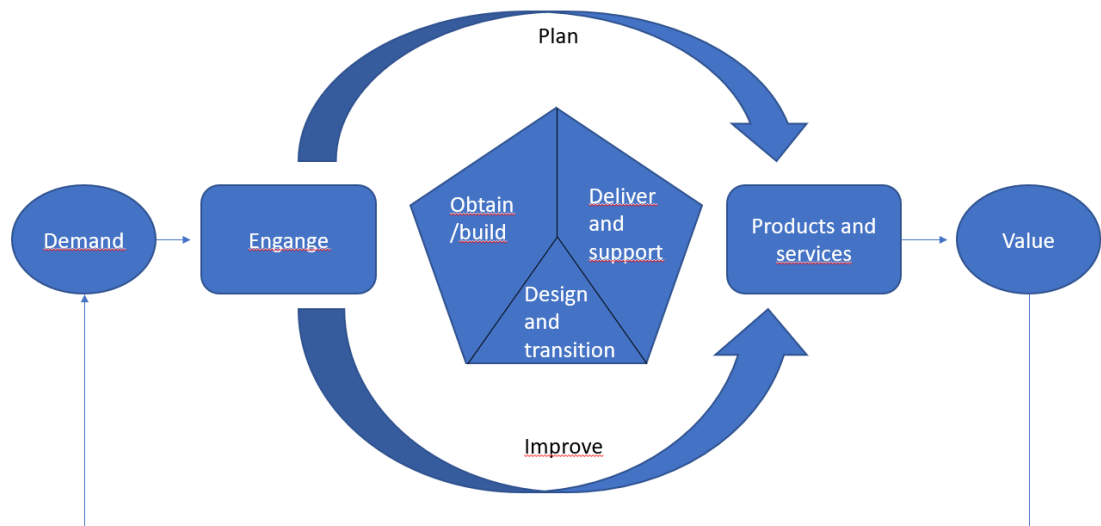


Figure 15. The ITIL service value chain (ITIL Foundation ITIL v4 Edition, 2019, p 58)

4.1.4 ITIL management practices

The other central part of the service value system is management practices. Practices in ITIL framework are more like processes to consider when creating or improving services. There are 34 different practices defined in ITIL v4 but it is not essential to implement all of them. In this research, I will be looking into more detailed in the Service management practices. I will set up a workshop, where we are looking into practices and which would be beneficial to us. The most important practices in the case company's user support unit are:

- Incident management
- Problem management
- Release management
- Service desk
- Service level management
- Service request management

4.2 Lean framework in service design

Lean is philosophy in a process management where delivery chain is viewed as a whole. It concentrates on maximizing customer value and minimizing waste. Lean was originally developed for factory manufacturing, but it has been widely used in the service management since that.

4.2.1 Waste in Lean

Most important part of the lean thinking is to recognise and eliminate the waste, decrease the costs and improve the quality. Variance is an important metric in lean thinking and when you decrease variance, waste is decreased as well (<http://www.sixsigma.fi/fi/lean/yleinen/lean-ja-johtaminen/>). To be able to change processing times more predictable, process must stable enough. To measure the stability of the process, statistical process control (SPC) is a good tool for it (Torkkola, S., Lean asiantuntijatyön johtamisessa, 2015, p158). With SPC we can create SPC-i cards to monitor stability of the process. First, we need a sample data (20 samples in our case) and following parameters must be calculated:

- Mean
- Moving range (Difference between two successive data points)
- Mean moving range
- Upper control limit (Mean + 2,659*mean moving range)
- Lower control limit (Mean – 2,659*mean moving range)

Constant 2,659 in the equation was developed by Walter A. Stewart based on empirical studies (Torkkola, S., Lean asiantuntijatyön johtamisessa, 2015, p160)

In the CSA, one of the weakness was the lack of SLA and other metrics. This would help the user support to create realistic SLA or other useful metrics to follow.

4.2.2 PDSA Cycle

PDSA cycle is another key concept of Lean philosophy. It is a framework for planning, testing and implementing improvements in any process.

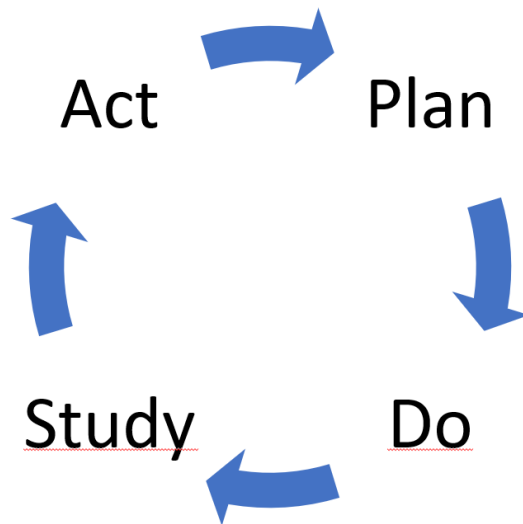


Figure 16. PDSA cycle

Four states of the PDSA cycles are

- Plan the change
- Do the change
- Study based on measurable outcomes if the change had expected effects
- Act based on measurements and start planning next cycle of improvements

4.2.3 Work in progress

One of the basic rules of Lean is to limit the amount of work in progress. The more one does have under work, the less they finish. Context switch is taking resources and that is considered as waste. (<https://leankit.com/learn/kanban/why-we-need-wip-limits/>)

Little's law provides a mathematical approach to estimate cycle time. Cycle time is the amount of time it takes for one work item to go through the whole process. Little's law

can be written as equation $CT = WIP/R_e$ where CT is cycle time, WIP is amount of work in progress and R_e is average time spent in the queue (Torkkola, S., Lean asiantuntijatyön johtamisessa, 2015, p 190).

5 Building a proposal

This chapter summarizes all the improvement ideas I have collected in workshops and literature review. All the persons in the user support were invited in the workshop and general idea was to ask what we could do better. We had an ITIL training few months before the workshop, so everybody had an idea how ITIL sees our processes.

5.1 ITIL practices used in User support

This section describes our main practices and how they are compared to ITIL practices

5.1.1 Incidents and Service requests

Incidents and Service requests are the core practices in User support. As found in the current state analysis, unclear ticket processing workflow is one of the reasons why tickets are left open. We agreed on work flow that should be used systematically in both work items:

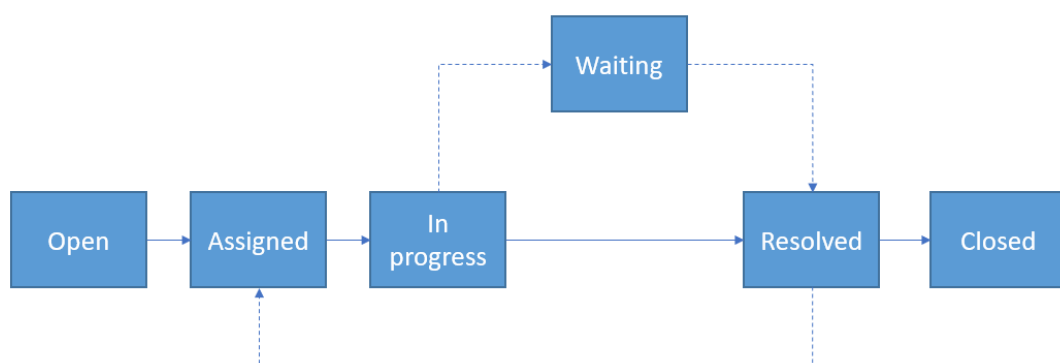


Figure 17. Work flow for Incidents and Service request

A ticket is opened automatically when email is received in the mailbox. After that, the ticket is assigned in the correct work queue and waits until a technician takes it under work. The ticket is in progress state as long as the technician is working on it. If the

technician e.g. asks customer more information, the ticket is set to Waiting state. When the resolution is provided, the ticket is set to Resolved state and will be closed automatically in 2 weeks if the customer has not commented anything on the resolution. If the customer rejects the resolution, ticket is set back to Assigned state.

Other common principles for processing Incidents and Service request:

- If a bug is created based on an incident, the incident must be closed immediately after the bug is created to keep the discussion in one place.
- Incident/Service request is closed if the customer has not replied for information request within 5 work days.
- Incident/Service request is closed when the actual work is not within the user support and a task is created for it. This will help keeping the WIP down.

5.1.2 New category for incidents

There should be a new category for incidents. Root cause category will include following values:

- Actions created by the customer
- Actions created by the support team
- Hardware failure
- Lack of feature in the system
- Incomplete introductions
- Invalid configuration

This new category will help us to analyse the root cause of the incident and take preliminary actions to decrease the amount of incoming tickets.

5.1.3 Problems

We already had Problem practice as ITIL suggests but it had been a problematic process because technicians could not get anything out of it. Problem items were created but then they were left to the ticketing system and no one seemed to actually do anything with them. Also, it took a lot of time to maintain them and it was unclear when to close them, because we deal actual bugs in the software in Production bug process. In the workshop, we came up with light version of problem management process. People can still add problem items, but no one is actively maintaining it. If a technician finds an unclear error and is not sure if it is a bug, they can see if there is anything in Problems about it. If one creates a new problem item, it is their responsibility to close them when the bug is created about it.

5.1.4 Change management

We had the Change management practice implemented but since we have the different tool (MS TFS) for actual implementation of the changes, it was duplicate work for it. In the workshop we came up with the solution, where we keep adding Change management items only for the items that can be done within our own team, such as configuration changes and access right changes. All the other changes where we need vendor to do the implementation, we will not create a change management item in SD+.

5.1.5 Method of selecting tickets

Currently we are using different methods for selecting tickets to work on. We should focus on working on the tickets with Fi-Fo (first-in-first-out) method to have a predictable resolving time. If tickets are resolved in random or prioritized order, the time a ticket must wait before it is processed, varies and cannot be systematically predicted. According to the Kingman formula, mean lead time increases if

1. Mean process time increases
2. Deviation increases
3. Utilization rate increases

Process time and utilization rate are more challenging to effect on, but deviation can be affected with Fi-Fo method of processing tickets. (<https://www.allaboutlean.com/king-man-formula/>)

5.2 Metrics

This section describes the metrics we should introduce in the user support unit.

5.2.1 SPC graphs

As Torkkola says, SPC graphs are good method to visualize deviation in services ((Torkkola, S., Lean asiantuntijatyön johtamisessa, 2015, p158). We should implement SPC cards for incoming, resolved, resolution times and work in progress tickets.

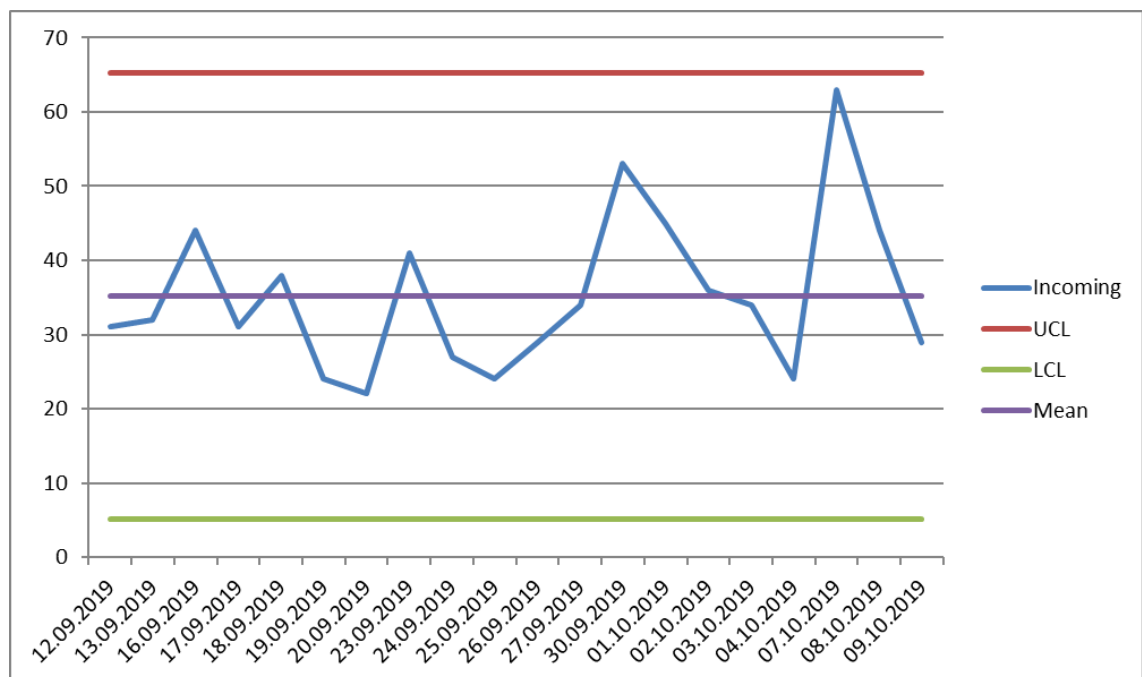


Figure 18. Incoming tickets in SPOC FCR

Above figure shows incoming tickets in SPOC FCR line where mean is 35 tickets per day and Upper control limit is 65 tickets per day. UCL limit is +3 process standard deviation (3 sigma's) from mean and statistically 99,7% of the daily amount of incoming of the tickets are below it. If there are more than that, it is a clear signal to investigate why it happened. This is a good tool to monitor stability of the process and gives indicator

when something is out of line and needs extra attention. Test data from the previous 30 days shows that everything is between control lines and within six sigma.

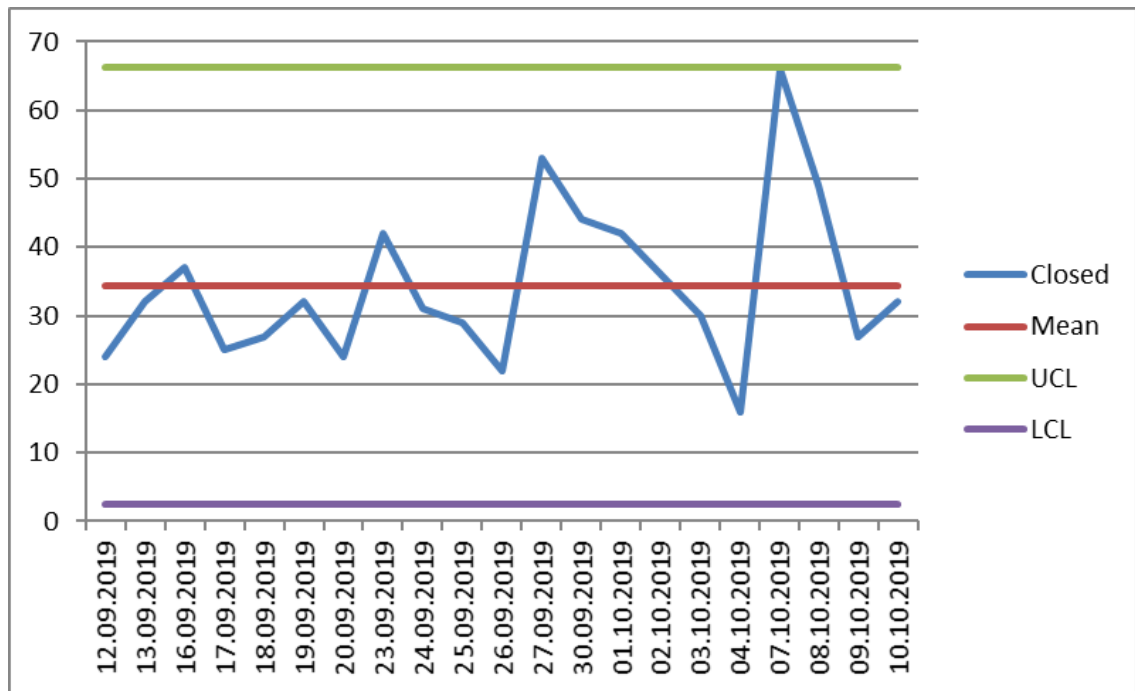


Figure 19. Closed tickets in SPOC FCR

Above figure shows closed tickets in SPOC FCR line for last 30 days. Mean is 34 tickets per day, and it is close to amount of incoming tickets (35 tickets per day). Deviation is between UCL and LCL so in that sense everything is within normal deviation.

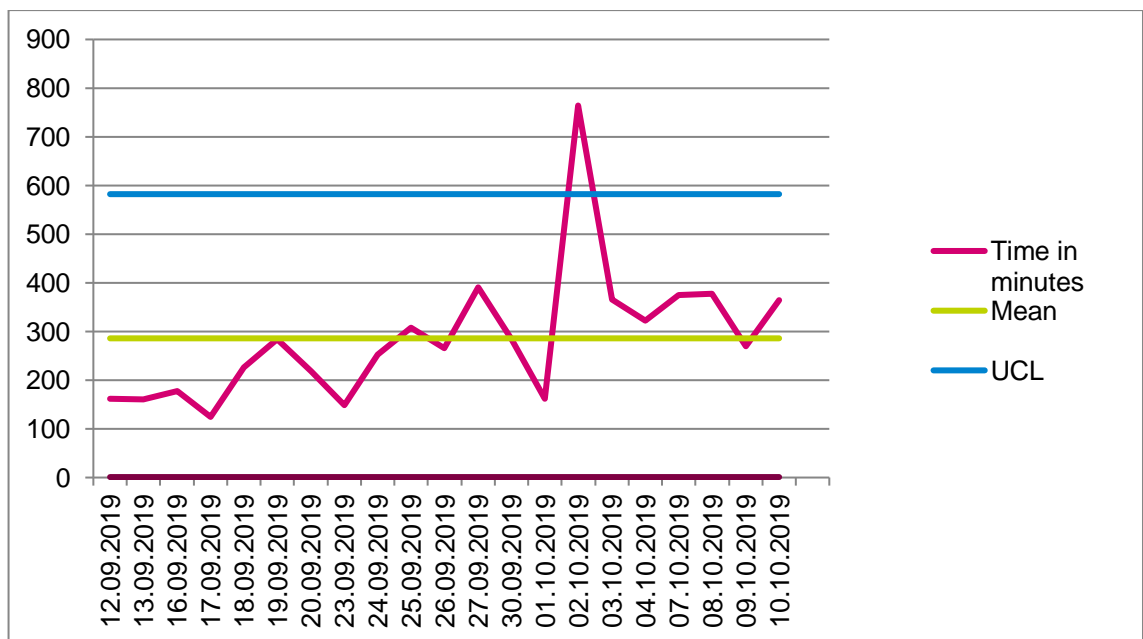


Figure 20. Resolution time in SPOC FCR

Above figure shows daily mean resolution times in SPOC FCR line for last 30 days. Mean is 286 minutes (4 hours 46 minutes) and UCL is 582 minutes (9 hours 42 minutes). This would give us data to set up realistic SLA. Based on the data, we can promise that 99,7 % of the tickets will be resolved within 9 hours 42 minutes, so it would be fairly safe to set SLA to 8 or 9 hours. There is one peak shown in the graph at 2.10.2019 and it will require closer investigation why it happened.

5.3 Conclusion

This chapter describes how solutions are corresponding the problems found in the current state analysis.

Problem	Solution	Theoretical background
Unclear workflow for ticket processing	New workflow and active communication to get the team committed to it	ITIL management practices (Chapter 4.1.4)
Lack of metrics to get the big picture	SPC cards implemented	Lean SPC cards (Chapter 4.2.1)
Resolving time of the ticket is not predictable	Fi-Fo method for selecting tickets	Lean decreasing variance (Chapter 4.2.1)
Problem items are never closed	New simplified process for Problem items	ITIL management practices (Chapter 4.1.4)
Double booking in change management process	New simplified process for change management	ITIL management practices (Chapter 4.1.4)

6 Validation of the proposal

6.1 Validation overview

This section describes the validation process of the proposal. Validation was done with interviews of managers and a review workshop with the team. I will present initial proposal and collect comments from managers from their perspective and comments from the team if they see any challenges implementing them.

When implementing changes, we will follow the PDSA cycle introduced in chapter 4.2.2. First, we will plan the change, then implement it, third we will study how it affected and fort we will plan any necessary changes.

6.2 Results from validation

This section describes the changes we are doing to initial proposal based on the comments we got in the review round.

6.2.1 Method for selecting tickets

First-in-first-out was seen interesting experiment. It has great potential to help with knowledge sharing within the team because everyone works on all sort of tickets. This might have negative impact on resolution times at the beginning, but it should improve when team members have learnt new areas to work on. We agreed on few exceptions for selecting new tickets but mainly it will be Fi-Fo for a test period of one month. There was discussion if a month is too short time to start getting benefits of it, but at least we have more detailed investigation after a month. SPOC FCR and UMA support will be combined but Online services and authorization will be separated from those. Therefore, in the future there will be work queues:

- UMA Support
- Online service support
- Authorization
- Access rights

6.2.2 Feedback from ticket resolutions

We had the survey for whole company at the beginning of the project, but it did not give us any clear points of improvements. According to interviews, it was important that we get more, and we decided to implement more regular ways to collect it. One suggestion was to add a feature in ticketing tool, where we would ask feedback from the customer after each ticket resolution. Our ticketing tool, ServiceDesk+, provides a feature that we can send email to a customer after the resolution and ask what they thought of it. This will be implemented as soon as we get it configured.

6.3 Conclusion

This chapter summarizes how validation was done and how the initial proposal changed after it.

First, I introduced the proposal to the team, and all had a change to give feedback and we were able to throw in ideas to improve the proposal. In this workshop changing the selecting method to Fi-Fo was seen most risky part. In generally, it was believed to help with knowledge transfer but to increase the resolving times at the beginning.

After the first workshop I presented the proposal to my unit leader and comments were mainly positive. He was also suspicious about one-month trial for Fi-Fo and new work queues, but we agreed to extend the test period if results are unclear.

What we added to the proposal was the feedback option for individual ticket resolution to get better and more accurate feedback on daily basis.

6.4 Implementation plan

This section describes how we implement the changes found during the project. Implementations will be done according to the plan and we will study the impact on regular basis to improve the process constantly.

Implementation item	Metrics to monitor	Review cycle

New work flow and processing rules for tickets	Average closing time	1 month
New category for incidents	Amount of incoming tickets	3 months
New process for Problems and Change management items	Amount of closed tickets	3 months
New methods for selecting tickets	Average closing time	1 month
Implementing SPC cards	Amount of closed tickets and average closing time	1 month
New work queues	Amount of closed tickets and average closing time	1 month
Feedback from ticket resolution	Customer satisfaction level	1 month

Table 5. Implementation plan

7 Discussion and conclusions

7.1 Summary

This thesis was written to improve processes in the User support. We have had more users year after year and it requires more efficient processes to keep up with the increasing demand. ITIL and Lean were pretty much pre-selected because of the decisions made in the company and unit years ago, so it was clear that I would concentrate on those. I started with the current state analysis and it was done in two parts; First I did

interviews with the experts from the User support and after that I had the survey for all the personnel. Feedback from the team regarding current state analysis turned out very useful for finding out the practical problems in the process, where answers from the survey did not give me any big revelations. I started going through literature after the CSA, looking into the problems we found in the interviews and I found some interesting points, but most of the input for the solutions came from the team again in the workshop I held to create the proposal.

7.2 Evaluation of the thesis

This chapter provides self-evaluation of the thesis and reflect the results into the problem I described at the beginning.

7.2.1 Outcome vs objective

Objective was to improve the processes in the way we can process more tickets with the similar size team. This will be seen in the future when we have implemented the changes described in the thesis, but I am confident that there will be positive results in some sense. It might be that average resolution time stays at the same level, but due to changes in work queues and ticket selection, we have wider level of expertise and we are not so dependent on certain people when everyone is involved basically in all the parts of the work our section is doing.

7.2.2 Reflection & afterword

This was a heavy journey I was forced to take in sense of the degree, but I am sure we got improvements that I would have not found without it. I believe the solutions we found during the thesis project are more valuable than the scientific contribution of this thesis and therefore I am quite happy with the results in any case.

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